

Comparison of Patient Warming Devices in a Hypovolemic Animal Model

- **Captain Scott F. Sanders**
- **Captain Timothy L. Shaw**
- **Captain Marlene B. Wallace**

Significance

- Sparked by experiences during Operation ANACONDA
- More casualties than expected
- Longer wait for medical evacuation from hostile area
- Sub-zero climate on snowy mountaintop

Significance

- Austere environments: Field and during aeromedical transport
- Logistical burden
- Unreliable power sources
- Small footprint, man-portable: previous studies conclude that warming devices alone, are not effective

The Directive

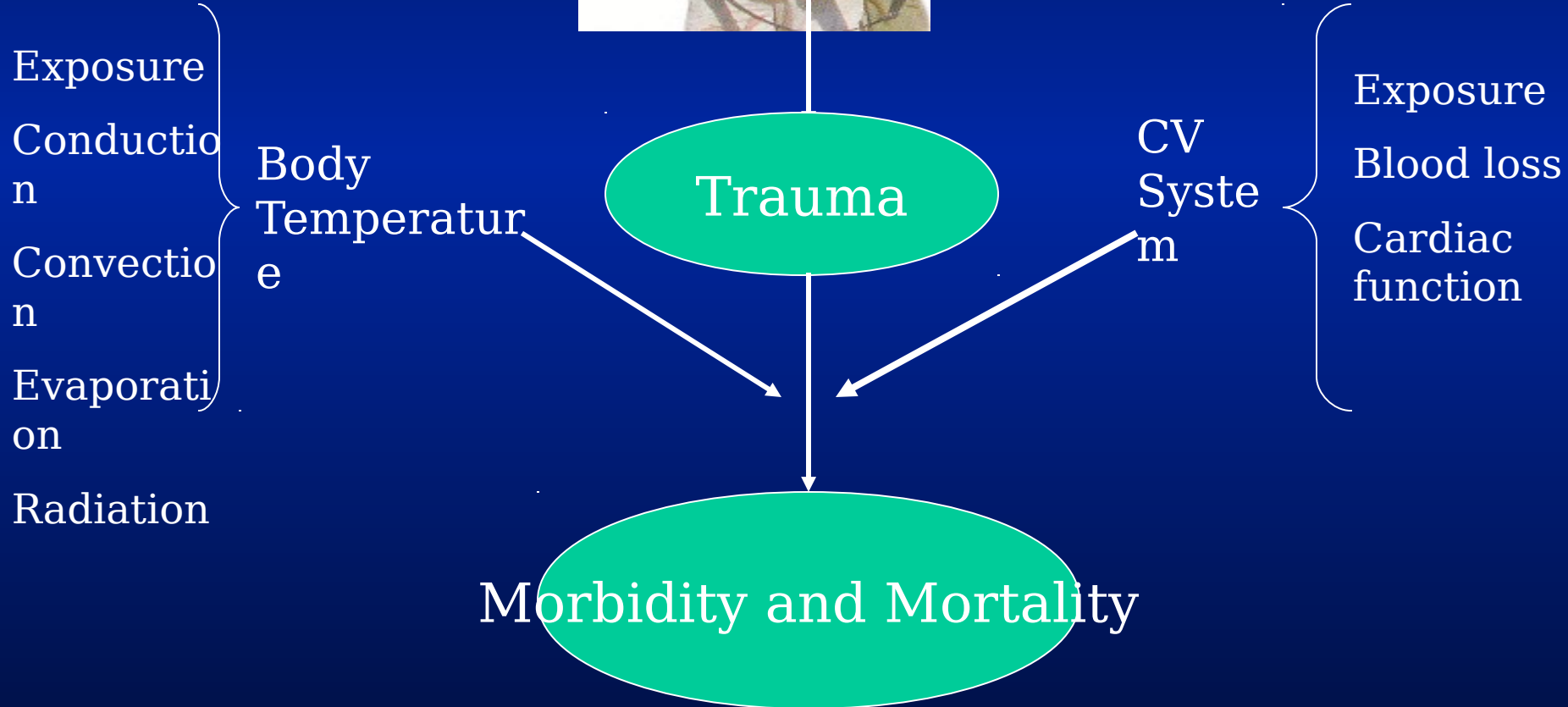
- Due to lessons learned from after action reports, Surgeon General mandated an improved warming technique
- Empowered WHMC to find an efficient warming device for Para rescue
- WHMC's research team's findings showed that their warming devices were not effective
- Suggested further research on current inventory assets

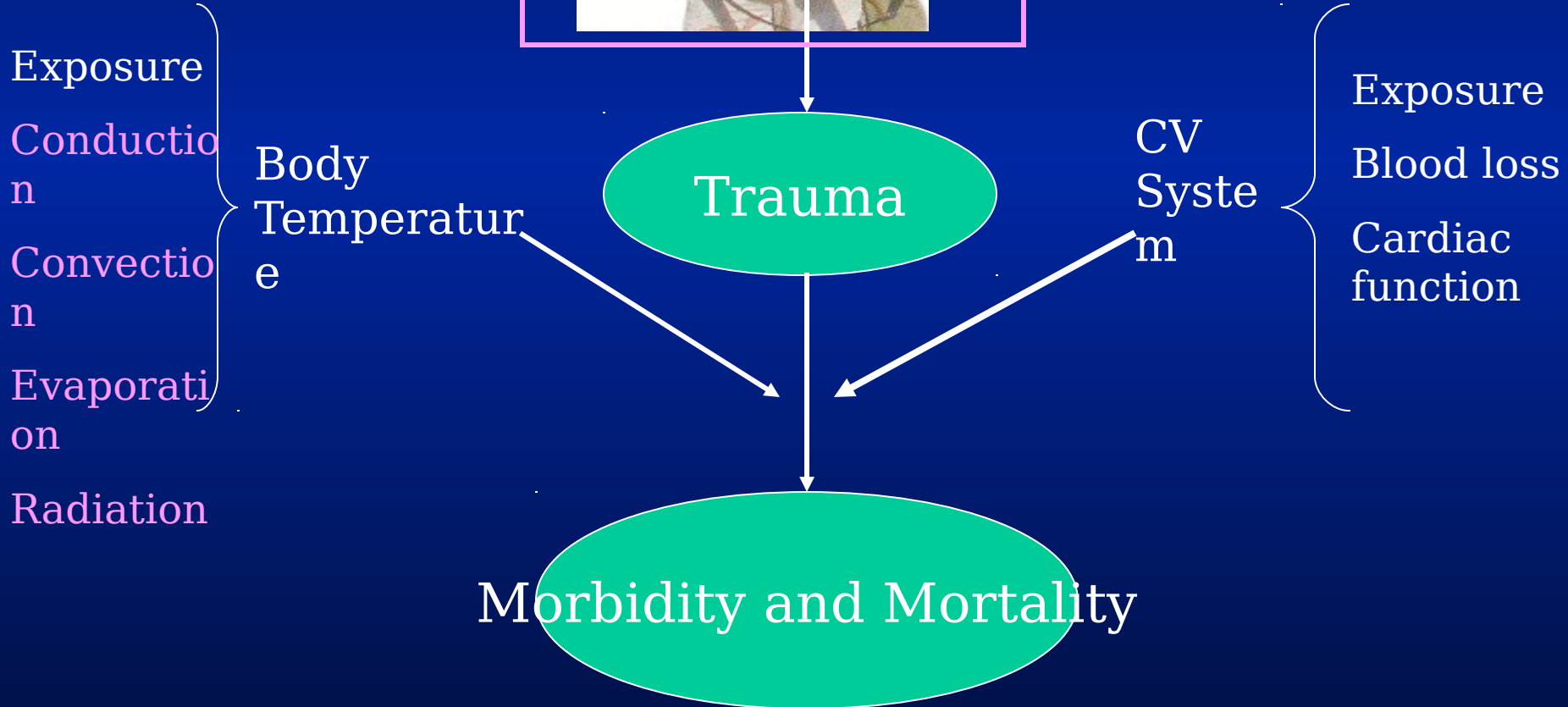
Aim

The aim of this study is to evaluate the efficacy of the ChillBuster®, in conjunction with the space blanket, as a device in preventing heat loss in subjects with resuscitated hypovolemic shock that are exposed to environmental conditions common in aeromedical transport.

Theoretical Framework

- Steady State: The ability of an organism to maintain its internal environment, derived from Claud Bernard's theory of homeostasis
- Mechanisms of heat loss:
Radiation, Convection, Conduction and Evaporation





Review of Literature

- Comparison of Patient Warming Strategies in Deployed Environments (Schmelz et al, 2003).
- Hypothermia from Realistic Shock Model (Silbergleit, et al 1998).
- Comparison of of four intraoperative warming devices (Ouellette, 1993).

Research Question

Is there a change in core body temperature from baseline after six hours of cold exposure with a ChillBuster® and space blankets used together as a warming device in normothermic subjects?

Research Question

Is there a change in core body temperature between subjects warmed with the ChillBuster® and space blankets used together as a warming device as compared to subjects warmed with the standard military wool blanket?

Design

- True experimental design:
Randomization
Intervention
Control

Mixed design: within and between subjects

Analysis of Data

- After 6 hours compare T_0 and T_{end}

- $T = T_0 - T_{end}$

Compare control group T and
experimental group T

Power Analysis

Alpha = .05

Power = 80%

n = 7 per group

Standard deviation = 1.6

Effect size = Medium

Procedure

Methods

Our study will include seven animal subjects (sus scrofa swine) in experimental and control groups

Control: the standard aeromedical evacuation device (wool blankets)

Experimental: our device (combination) Chillbuster/Space blanket/wool blanket

Hypovolemic Shock Model

Temp

45 Min.
MAP 30mmHg

60 Min.
500cc Hespan

Post trauma
Temp 0

Baseline Hemodynamics → Partial Resuscitation → Blood Return

Hypothermic environment model

Temp_o

6
Hours

Temp_{end}

NMB → Transport → Cold →
End

Given to cooler environment

Data Collection

- Allow animals 15 min to equilibrate

After this stabilization period,
baseline measurement taken
Temp and hemodynamic parameters
measured every 5 min

Temp at the end of 6 hours = T_{end}

Questions